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(56) Documents Cited

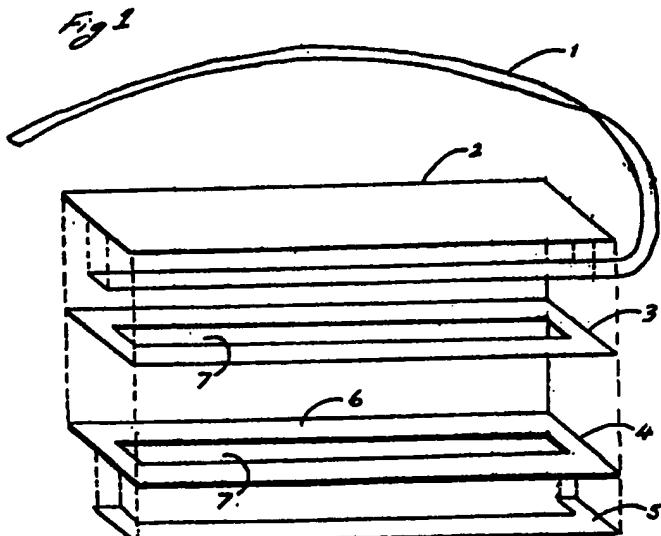
GB 2268728 A US 5283517 A US 5184182 A  
US 5080745 A US 4732277 A

(58) Field of Search

UK CL (Edition M) B8P PG1 , G2X XFC  
INT CL<sup>5</sup> G03G 15/08

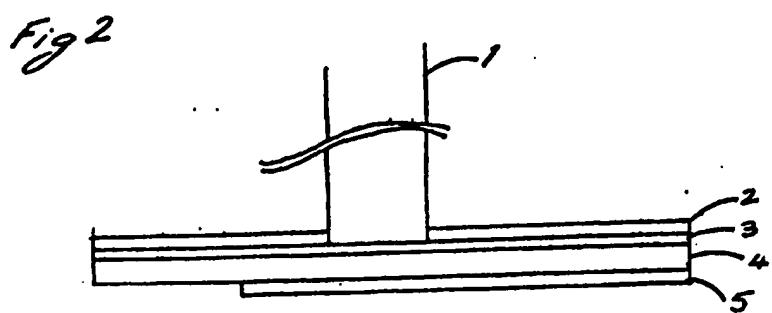
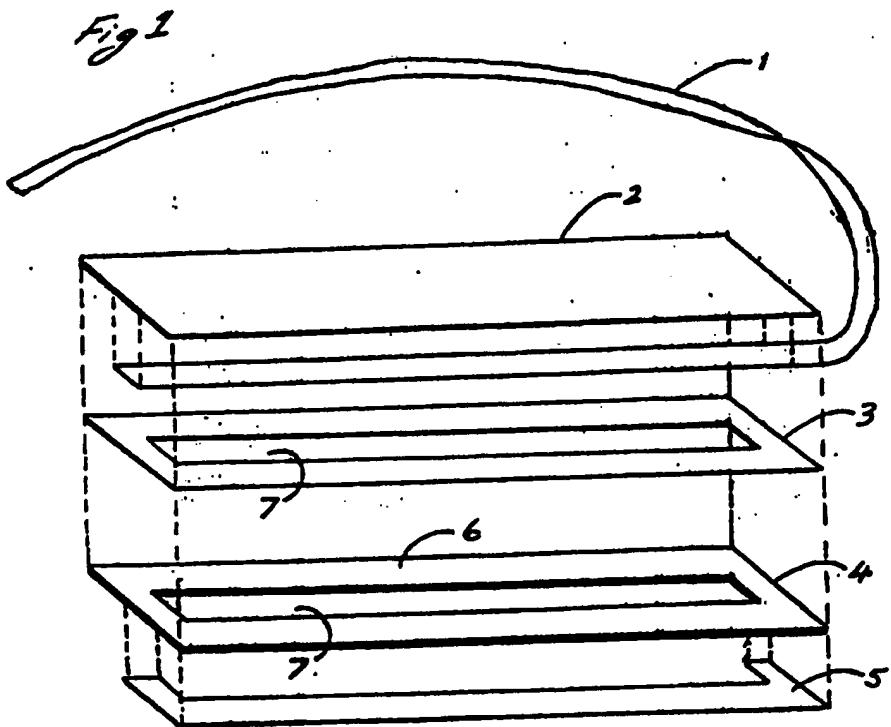
## (54) Seal for toner hoppers

(57) A toner hopper seal insert incorporating a tear strip for refilled toner cartridge used in printers and copying machines comprises (a) a length of tape (2) which has uni-directional fibres orientated along the longitudinal axis of the tape, (b) a narrower strip of material (1) which is laminated onto the surface of this tape, which extends beyond the length of the tape and acts as a tear strip, (c) a semi-rigid die cut plastic substrate (4) onto which one face has an adhesive (3) so that the wide tape to be bonded to the substrate, the substrate having an apertured (7) covered by the tear strip and being positioned slightly off-centre according to the horizontal axis of the substrate and (d) a 'U' shaped length of adhesive (5) laminated to the narrower edge by the substrate (4). When the tear strip (1) is pulled, it will cause a length of tape to be torn from the surface and expose the aperture (7) in the substrate. The lower adhesive 'U' section (5) will ensure that the seal is bonded to the cartridge preventing the seal to lift off from the surface of the cartridge hopper. Also the seal is mechanically retained by locating the widest edge (6) of the substrate into a groove in the hopper opening.



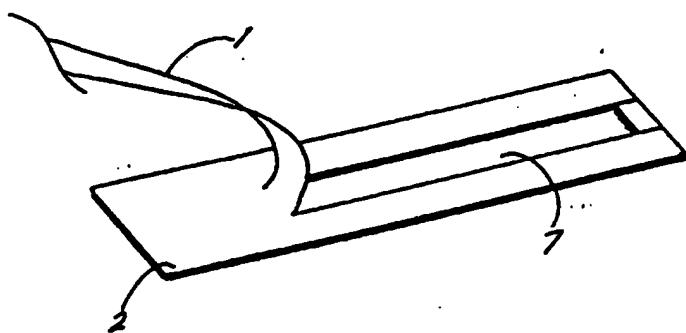
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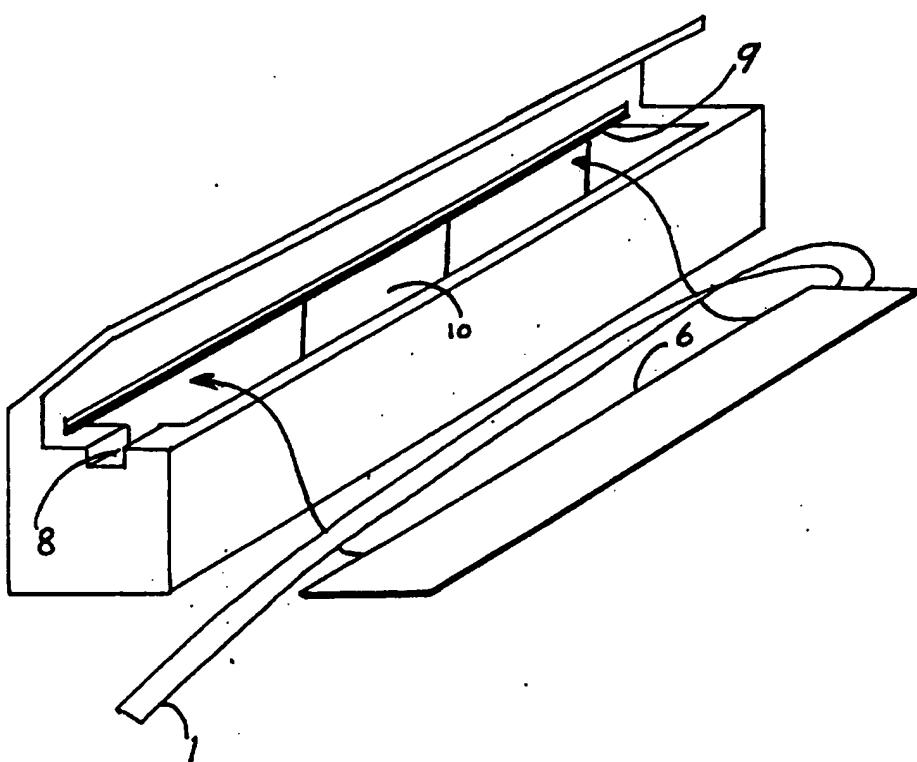
2/3

Fig 3



3/3

Fig 4



**LASER XEROGRAPHIC DRY TONER HOPPER SEALING DEVICE****BACKGROUND TO THE INVENTION**

This invention relates to an apparatus for providing means for resealing a toner hopper which is a part of an expensive toner cartridge used on a dry toner printer or photocopying machine in order that the hopper filled with dry toner can be shipped from one location to another without spillage of the dry toner powder which behaves similar to a liquid.

The original manufacturers of the cartridges will supply already built into the cartridge a seal which when pulled by the cartridge user will enable the toner to flow into the cartridge mechanism. Failure to provide an efficient seal will determine that the toner powder will leak out of the cartridge during transit. As a result of this leakage the user will most likely reject the replacement supplied.

There is now in existence an emerging international industry which specialises in the remanufacture or refilling and replacement of worn component parts commonly found in the cartridges of a variety of makes and types. In order to provide a high quality service it is necessary when remanufacturing a cartridge to refit some kind of replacement seal as the original one supplied is consumable and used once only.

There is in existence a variety of cartridge seals now available to the remanufacturer however most of them demonstrate at least one major defect which causes a non-optimum performance. i.e. some are difficult to install, some are too rigid, cumbersome, fragile and high failure rates caused when the seal is removed which in many cases may not provide a sufficient opening for the toner to flow out of the hopper.

**SUMMARY OF INVENTION**

Accordingly, it is an object of this invention to provide a new and optimum toner seal apparatus and method for re-sealing re-filled dry toner hoppers, which are usually components of toner cartridges, in a manner to allow for the transport of these re-filled dry toner cartridges from one location to another, without spillage of the toner from the re-filled hopper, using a semi rigid plastic windowed-substrate which on one face has a wide tape with a tear strip laminated to it. On the lower face it has an area of adhesive lamination in order that the windowed-substrate is held in place when located into the hopper. Furthermore this complete component has been designed to permit easy installation and the locking in place by means of the long edge inserting into a groove found in the hopper. This permits the minimum use of adhesive and ease of subsequent removal. Moreover, it is also an object of this invention to provide a material system which in the case of the ribbon and tear strip are bonded together so when the tear strip is pulled there exists no or little risk of the seal bunching up within the hopper causing failure of the tape complete removal. It is another object of this invention that the material chosen in the case of the tape that it has an orientated fibre which when torn by means of the tear strip it will always cause a tear in a straight line which in turn reveals the complete aperture in the substrate through which the toner

will flow. It is also an object of this invention that the revealed aperture will provide an opening no less than 4 mm wide.

The seal as described in this invention comprises of five components such that when they are bonded together they form a flat rectangular structure which has an extended piece of strip which is longer than the length of the seal. This extended strip is folded back on itself and exits the cartridge hopper. This extension is the means by which a cartridge user is able to produce an opening within the hopper through which the dry toner may flow.

#### BRIEF DESCRIPTION OF THE DRAWINGS

This invention, together with other objects features aspects and advantages thereof will be more clearly understood from the following description considered in conjunction with the accompanying drawings.

FIG 1 is an isometric view of the five pieces of material used in this invention.

FIG 2 is an end view of this invention

FIG 3 shows the top view and demonstrates how the tear strip is responsible for removing a longitudinal section from the fibre tape causing a uniform strip to be removed hence exposing the windowed substrate below.

FIG 4 is an isometric view of a typical dry toner hopper showing orientation of seal prior to insertion.

Referring to fig 3 a dry toner hopper seal referred to generally by reference 3 is installed into fig 4, indicated by arrows. Once installed by means of 6 locating into 9 a slot running the length of the dry toner hopper. The pull strip 1 is folded back onto itself and exits the cartridge hopper via item 8 which is a feature of the cartridge hopper. Having located 6 rear arm of the seal into 9 the removal of the protective cover of 5 this exposes the adhesive and assists with the retention of the seal and toner escaping from 10 the hopper aperture. Item 5 also prevents the seal from lifting up ensuring that the tear strip will efficiently remove a strip of ribbon tape from item 2.

Referring to fig 1 shows the various components which comprise the entire seal as illustrated in fig 2 and 3. Still referring to fig 1 numeral 1 is a length of tear strip where the width must have a minimum dimension of 3 mm in order to be effective, numeral 2 is a piece of ribbon tape comprising of uni-directional fibres which are orientated along the longitudinal plane of the tape. This is to cause a uniform removal of ribbon tape when the tear strip 1 is pulled. The ribbon tape covers the entire area of the seal and tear strip 1, however, the tear strip may comprise of two lengths joined together. The tear strip 1 is bonded to 2 the ribbon tape and 4 the semi rigid plastic substrate by means of item 3 a piece of double sided adhesive which has been die-cut to the same dimension as 4. Additional adhesive may also be applied to the upper face of 1 in order to assist with the ribbon tape removal from the hopper which will help eliminate the possibility of any material bunching at item 8 when the tear strip is pulled. Item 5 is a 'U' shaped die-cut piece of double sided adhesive. This is bonded to the lower face of 4 front arm which is slightly narrower than the rear arm 6. Item 6 is slightly wider as this ensures that when the seal is located into the hopper the tear strip 1 is centred and correctly aligned with 8.

**FIG 2** Shows how all the components are bonded together to form a thin semi rigid seal comprising of 1 tear strip, 2 uni-directional fibre ribbon tape, 3 double sided die-cut adhesive, 4 die-cut semi-rigid plastic substrate onto which all of the components are mounted and 5 a die-cut piece of double sided adhesive tape.

**FIG 3** Shows how when all the components are bonded together and the tear strip is pulled it removes a length of ribbon tape in a straight line to expose item 7 the apertures in 4 and 3.

**CLAIMS**

1. A sealing means for sealing a toner hopper used in laser xerographic printer or photocopying machine dry toner cartridges.
2. The sealing means as in claim 1 which comprises of five material components.
3. The sealing means as in claim 1 and 2 where the five elements are made from either uni-directional fibre tape, polyester or polypropylene tear strip, polycarbonate or polystyrene plastic substrate with a die cut window aperture, adhesive system which may be provided by means of an acrylic material, a adhesive system which comprises of a piece of die cut double sided tape and a length of tear tape which is no less than 4 mm wide made from polyester or other stretch resistant polymeric film.
4. The sealing means as in claims 1,2,3, where the windowed plastic substrate may have the window positioned slightly off centre in the longitudinal axis of seal.
5. The sealing means as in claim 1,2,3,4, where the widest section of the windowed substrate item 6 is mechanically located within a groove found in the toner cartridge hopper so as to provide an efficient installation of the seal into the hopper.
6. The sealing means as in claims 1,2,3,4,5, where the narrowest arm of the windowed aperture has a die cut section of double sided tape located on the underside of the seal in order that the adhesive will lock the seal into position once located.
7. The sealing means as in 1,2,3,4,5,6, where the tear strip will double back upon itself and exit the cartridge hopper at item 8 and permit the execution of a uniform tear when pulled.
8. The sealing means as in claim 1,2,3,4,5,6,7,8, where when the tear strip produces a tear and material removal no less than 4mm wide along the longitudinal axis of the seal.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**(The Search report)**

Application number  
**GB 9415811.0**

<b>Relevant Technical Fields</b>		Search Examiner <b>M K B REYNOLDS</b>
(i) UK Cl (Ed.M)	G2X - XFC B8P - PG1	
(ii) Int Cl (Ed.5)	G03G 15/08	Date of completion of Search <b>30 SEPTEMBER 1994</b>
<b>Databases (see below)</b>		Documents considered relevant following a search in respect of Claims :- <b>1-8</b>
(ii)		

**Categories of documents**

X:	Document indicating lack of novelty or of inventive step.	P:	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	E:	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	&:	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2268726 A	(XEROX) figures, especially Figure 6	1 and 2
X	US 5263517	(TOSHIBA) figures, especially Figure 3	1 and 2
X	US 5184182	(MICHLIN) Figures 3-6	1, 2 and 5
X	US 5080745	(PAULL) Figures 6-8	1 and 2
X	US 4732277	(XEROX) Figures 4-5	1 and 2

**Databases:** The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).